AF

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

NCR Docket No. 9417

Application of:

PEDERSON, D. R.

Group Art Unit: 2164

Serial No. 09/784,392

Examiner: Wong, Leslie

Filed: February 15, 2001

For: OPTIMIZED END TRANSACTION PROCESSING

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

APPEAL BRIEF TRANSMITTAL LETTER

Sir:

Transmitted herewith for filing is an Appeal Brief to the Final Rejection dated October 30, 2006.

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Respectfully submitted,

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By:
Name: Michelle George

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Donald R. Pederson et al. Group Art Unit: 2164

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For: **OPTIMIZED END TRANSACTION PROCESSING**

Mail Stop Appeal
Commissioner for Patents
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APPEAL BRIEF

(i) Real Party in Interest

The real party in interest is NCR Corporation, a Maryland corporation, having a principal place of business at 1700 South Patterson Blvd., Dayton, OH 45479.

(ii) Related Appeals and Interferences

This is an Appeal Brief following a Notice of Panel Decision from Pre-Appeal Brief Review dated February 26, 2007.

(iii) Status of Claims

Claims 1-43 are pending in the Application. Pursuant to an October 30, 2006 Office action and the February 26, 2007 Notice of Panel Decision from Pre-Appeal Brief Review, claims 1-43 are rejected.

(iv) Status of Amendments

No amendments were filed subsequent to the October 30, 2006 Office action.

(v) Summary of Claimed Subject Matter

Independent claim 1 recites a computer implemented method of performing a transaction in a database system (*see, e.g.,* Application, pg. 3, line 2; FIG. 2; FIG. 3; FIG. 4; FIG. 6). The method of claim 1 comprises:

receiving a transaction to be performed, wherein the transaction is processed by a plurality of access modules (*see, e.g.,* Application, pg. 3, lines 3-4; pg. 6, line 19 to pg. 7, line 13; pg. 11, lines 27-30; and pg. 12, lines 16-23; FIG. 2, "TRANSACTION" 34b; FIG. 3, "STEP" 38a through g and "ACCESS MODULE" 20a, k, p, r, t, v and x; FIG. 6, block 232, "PARSING ENGINE RECEIVES IMPLICIT TRANSACTION"); and

before any directive indicating commencement of an end transaction procedure is broadcast to the access modules, performing a flush of a transaction log from volatile storage to non-volatile storage by each of the access modules (*see, e.g.,* Application, pg. 3, lines 4-5; pg. 12, lines 1-6 and 25-27; and pg. 13, lines 16-18; FIG. 6, block 238, "PARSING ENGINE ADDS FLUSH OF TRANSACTION LOG TO STEP, PRIOR TO 'LAST DONE' COORDINATION").

Independent claim 10 recites a computer implemented method of performing an end transaction procedure in a database system (*see, e.g.,* Application, pg. 17, line 9-11; FIG. 10). The method of claim 10 comprises:

after commitment of a transaction, a first access module in the database system writing an end transaction indication to a first transaction log portion in volatile storage, the first access module being part of a cluster of access modules (*see, e.g.,* Application, pg. 17, lines 9-14; FIG. 10, block 402, "'LAST DONE' ACCESS MODULE WRITES END TRANSACTION – PART ONE DIRECTIVE TO ITS TRANSACTION LOG"); and

the first access module sending an end transaction directive to a fallback access module associated with the first access module, the fallback access module being part of the cluster (*see, e.g.,* Application, pg. 17, lines 15-17; pg. 15, lines 25-27; FIG. 10, block 406, "'LAST DONE' ACCESS MODULE SENDS DIRECTIVE TO FALLBACK ACCESS MODULE"; FIG. 8, "ACCESS MODULE" 20c is fallback for, *inter alia*, 20a).

Independent claim 17 recites a database system (*see, e.g.,* Application, pg. 4, line 25; FIG. 1). The database system of claim 17 comprises:

persistent storage (*see, e.g.,* Application, pg. 5, lines 16-17; FIG. 1, "STORAGE" 30a through d);

volatile storage (*see, e.g.,* Application, pg. 5, line 16; FIG. 1, "MEMORY" 32a through d); and

a plurality of access modules, wherein each access module is coupled to the persistent storage and the volatile storage (*see, e.g.,* Application, pg. 5, lines 1-17; FIG. 1, "ACCESS MODULE" 20a through d); and

each of the access modules being adapted to flush a transaction log maintained by the access module from the volatile storage to the persistent storage before any directive indicating commencement of an end transaction procedure is broadcast to the access modules (*see, e.g.,* Application, pg. 3, lines 4-5; pg. 5, lines 14-18; pg. 12, lines 1-6 and 25-27; and pg. 13, lines 16-18; FIG. 6, block 238, "PARSING ENGINE ADDS FLUSH OF TRANSACTION LOG TO STEP, PRIOR TO 'LAST DONE' COORDINATION").

Independent claim 21 recites an article comprising a computer readable storage medium storing instructions for enabling a processor-based system to (*see, e.g.,* Application, pg. 4, lines 18-20; FIG. 1):

receive a transaction to be performed, wherein the transaction is processed by a plurality of access modules (*see, e.g.,* Application, pg. 3, lines 3-4; pg. 6, line 19 to pg. 7, line 13; pg. 11, lines 27-30; and pg. 12, lines 16-17; FIG. 2, "TRANSACTION" 34b; FIG. 3, "STEP" 38a through g and "ACCESS MODULE" 20a, k, p, r, t, v and x; FIG. 6, block 232, "PARSING ENGINE RECEIVES IMPLICIT TRANSACTION");

determine that a last step of the transaction involves the plurality of access modules, wherein the last step is performed before any directive indicating commencement of an end transaction procedure is broadcast to the access modules (*see, e.g.,* Application, pg. 12, lines 21-23; and pg. 13, lines 16-18; FIG. 6, diamond 236, "ARE ALL ACCESS MODULES USED IN THE LAST STEP?"); and

flush a transaction log from volatile storage to a non-volatile storage while the last step is performed by the plurality of access modules (*see, e.g.,* Application, pg. 12, lines 25-27; FIG. 6, block 238, "PARSING ENGINE ADDS FLUSH OF TRANSACTION LOG TO STEP, PRIOR TO 'LAST DONE' COORDINATION").

Independent claim 24 recites a computer implemented method of performing a transaction in a database system (*see, e.g.,* Application, pg. 3, line 2; FIG. 2; FIG. 3; FIG. 6). The method of claim 24 comprises:

receiving a transaction to be performed on plural access modules in the database system (*see, e.g.,* Application, pg. 3, lines 3-4; pg. 6, line 19 to pg. 7, line 13; pg. 11, lines 27-30; pg. 12, lines 16-23; FIG. 2, "TRANSACTION" 34b; FIG. 3, "STEP" 38a through g and "ACCESS MODULE" 20a, k, p, r, t, v and x; FIG. 6, block 232, "PARSING ENGINE RECEIVES IMPLICIT TRANSACTION");

maintaining a log in volatile storage to track operations performed in the transaction (*see, e.g.*, Application, pg. 7, lines 14-30; FIG. 4, "TRANSACTION LOG" 25a, k and p); and

writing the log to persistent storage before any directive indicating commencement of an end transaction procedure is broadcast to the plural access modules (*see, e.g.,* Application, pg. 3, lines 4-5; pg. 12, lines 1-6 and 25-27; and pg. 13, lines 16-18; FIG. 6, block 238, "PARSING ENGINE ADDS FLUSH OF TRANSACTION LOG TO STEP, PRIOR TO 'LAST DONE' COORDINATION").

Independent claim 28 recites a database system (*see, e.g.,* Application, pg. 4, line 25; FIG. 1). The database system of claim 28 comprises:

persistent storage (*see, e.g.,* Application, pg. 5, lines 16-17; FIG. 1, "STORAGE" 30a through d);

volatile storage (*see, e.g.,* Application, pg. 5, lines 16; FIG. 1, "MEMORY" 32a through d);

access modules coupled to the persistent storage and the volatile storage (*see, e.g.,* Application, pg. 5, lines 1-17; FIG. 1, "ACCESS MODULE" 20a through d); and

a parsing engine coupled to the access modules (*see, e.g.,* Application, pg. 5, lines 1-5; FIG. 1, "PARSING ENGINE" 10, and "INTERCONNECT NETWORK" 12), the parsing engine adapted to perform one of:

(a) providing a directive with a message to perform a last step of a transaction and communicating the directive to the access modules, each access module responsive to the directive to perform a transaction log flush from the volatile storage to the persistent storage before any directive indicating commencement of an end transaction procedure is broadcast to the access modules (*see, e.g.,* Application, pg. 12, lines 25-27; and pg. 13, lines 16-18; FIG. 6, block 238, "PARSING ENGINE ADDS FLUSH OF TRANSACTION LOG TO STEP, PRIOR TO 'LAST DONE' COORDINATION"); and

(b) determining if each of the access modules has performed a transaction log flush before start of the end transaction procedure (*see, e.g.,* Application, pg. 14, lines 13-20; FIG. 7, diamond 254, "HAS TRANSACTION LOG BEEN FLUSHED?");

the parsing engine adapted to avoid sending a broadcast directive to the access modules to cause performance of a transaction log flush during the end transaction procedure (*see, e.g.,* Application, pg. 13, lines 16-18; and pg. 14, lines 20-21; FIG. 6; FIG 7).

(vi) Grounds of Rejection to be Reviewed on Appeal

Claims 1-43 are pending in the application.

In the October 30, 2006 Office action the Examiner rejected claims 1-9, 17-31, 34-35 and 38-41 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 5,544,359 to Tada et al. (hereinafter "Tada") in view of U.S. Patent 6,321,234 to Debrunner.

In addition, in the October 30, 2006 Office action the Examiner rejected claims 10-16 and 42-43 under 35 U.S.C. § 103(a) as being unpatentable over Tada in view of Jim Gray &

Andreas Reuter, "Transaction Processing: Concepts and Techniques" (Morgan Kaufmann, 1993) (hereinafter "Gray").

Finally, in the October 30, 2006 Office action the Examiner rejected claims 32-33 and 36-37 under 35 U.S.C. § 103(a) as being unpatentable over Tada in view of Debrunner and further in view of Gray.

Applicant is appealing the Examiner's rejection of claims 1-43.

In light of the arguments below, Applicant asks the Board to reconsider these rejections and to allow all of the claims.

(vii) Argument

The 103(a) Rejections over Tada in view of Debrunner

Applicant's claims 1, 17, 21, 24 and 28 recite, *inter alia*, methods, systems and articles for performing a flush of a transaction log from volatile storage to non-volatile storage before any directive indicating commencement of an end transaction procedure is broadcast to plural access modules. In rejecting claims 1, 17, 21, 24 and 28, the Examiner cites Tada as teaching, *inter alia*, "performing a flush of a transaction log from volatile storage to non-volatile storage by an access module" (*see, e.g.,* October 30, 2006 Office action, pg. 3, lines 1-2). However, the Examiner states that Tada does not teach "before any directive indicating commencement of an end transaction procedure is broadcast to the access modules" (*see, e.g.,* October 30, 2006 Office action, pg. 3, lines 4-5). In an effort to address this deficiency of Tada, the Examiner cites col. 9, lines 20-26 of Debrunner as teaching "before any directive indicating commencement of an end transaction procedure is broadcast to the access modules" (*see, e.g.,* October 30, 2006 Office action, pg. 3, lines 6-7).

As an initial matter, Applicant would like to respectfully point out that in determining the differences between cited art and the claims at issue, the Examiner ***must consider the***

claimed invention as a whole (*see* 35 U.S.C. § 103(a), "A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that ***the subject matter as a whole*** would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains." (emphasis added); *see also*, *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1537 (Fed. Cir. 1983), "Though findings on the 'differences' from the prior art are suggested by *Graham v. John Deere, supra*, the question under 35 USC § 103 is not whether the differences themselves would have been obvious. Consideration of differences, like each of the findings set forth in *Graham*, is but an aid in reaching the ultimate determination of whether the claimed invention as a whole would have been obvious."; *Ramsey Group, Inc. v. EGS Int'l, Inc.*, 329 F. Supp. 2d 630, 647 (D.N.C. 2004), "In making the assessment of differences, section 103 [of Title 35] specifically requires consideration of the claimed invention 'as a whole.' Inventions typically are new combinations of existing principles or features. The 'as a whole' instruction in title 35 prevents evaluation of the invention part by part. Without this important requirement, an obviousness assessment might break an invention into its component parts (A + B + C), then find a prior art reference containing A, another containing B, and another containing C, and on that basis alone declare the invention obvious."; MPEP 2141.02). As such, the Examiner may not dissect the claim language at issue and require, for example, that Tada teach only "performing a flush of a transaction log from volatile storage to non-volatile storage" absent consideration of, *inter alia*, ***when*** this flush occurs, or Debrunner teach only "before any directive indicating commencement of an end transaction procedure is broadcast to the access modules" absent consideration of, *inter alia*, ***what*** it is that must occur before such broadcast. On that point, Applicant would like to respectfully point out that any one of a hundred, a thousand, or more actions may occur before a directive indicating commencement of an end transaction procedure is broadcast to plural access modules involved in a database transaction. However, what is relevant in regard to Applicant's claims 1, 17, 21, 24 and 28 is that a flush of a transaction log from volatile storage to non-volatile storage occur before any directive indicating commencement of an end transaction procedure is broadcast to the plural access modules, which neither Tada nor Debrunner, alone or in any combination, teaches or suggests.

As noted hereinabove, the Examiner concedes that Tada fails to teach a flush of a transaction log from volatile storage to non-volatile storage occurring before an end transaction directive is broadcast to a plurality of access modules. Likewise, while, as noted by the Examiner, Debrunner may teach a private log cache "containing log record(s) describing a change to . . . a page [being] flushed before the end of the transaction" (*see, e.g.,* Debrunner, col. 9, lines 20-26), Applicant would like to respectfully point out that the above described flush of Debrunner is "from the private log cache of a task to the log page chain" (*see, e.g.,* Debrunner, col. 9, lines 27-33) which, pursuant to Debrunner, comprises flushing a log from volatile storage comprising the private log cache (*see, e.g.,* Debrunner, col. 9, lines 14-15, "private log cache[] – a region of memory reserved for the particular database connection or 'user,'") to volatile storage comprising the log page chain (*see, e.g.,* Debrunner, col. 8, lines 19-22, "As shown in FIG. 2B, the system log or 'syslogs' comprises an in-memory page chain 280 including, for instance, log page 281 and log page 283"), and not from volatile storage to non-volatile storage as required by Applicant's claims 1, 17, 21, 24 and 28. As such, neither Tada nor Debrunner, taken alone or in combination, teaches or suggests performing a flush of a transaction log from volatile storage to non-volatile storage before any directive indicating commencement of an end transaction procedure is broadcast to plural access modules as required by Applicant's claims 1, 17, 21, 24 and 28. As a result, Applicant's claims 1, 17, 21, 24 and 28, and their dependents, are patentable over Tada in view of Debrunner under 35 U.S.C. § 103(a).

The 103(a) Rejections over Tada in view of Gray

With regard to claim 10, in the October 30, 2006 Office action the Examiner states that "Tada discloses a method of performing an end transaction procedure in a database system, comprising: [a]fter commitment of a transaction, a first access module in the database system writing an end transaction indication to a first transaction log portion, the first access module being part of a cluster of access module[s]" (*see* October 30, 2006 Office action, pg. 10, lines 12-16). However, Applicant would like to respectfully point out that, in point of fact, Applicant's claim 10 recites, *inter alia*, a "method of performing an end transaction procedure in a database system, comprising: after commitment of a transaction, a

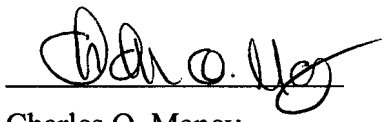
first access module in the database system writing an end transaction indication to a first transaction log portion ***in volatile storage***, the first access module being part of a cluster of access modules" (emphasis added). As such, even if Tada disclosed the method recited by the Examiner, such disclosure would not be sufficient to teach the relevant limitations of Applicant's claim 10.

Further, and more to the point, the portion of Tada relied on by the Examiner is in fact misapplied to Applicant's claim 10 as it teaches, *inter alia*, setting an "indication of completion of the transaction to the transaction file 115" (*see, e.g.,* Tada, col. 11, lines 57-16), where the transaction file 115 is provided on "***nonvolatile mass memory*** (103)" (*see, e.g.,* Tada, col. 8, lines 19-20) (emphasis added). As such, the relied on portion of Tada expressly does not teach a method of performing an end transaction procedure in a database system, comprising: after commitment of a transaction, a first access module in the database system writing an end transaction indication to a first transaction log portion ***in volatile storage***, the first access module being part of a cluster of access modules, as required by Applicant's claim 10.

Additionally, the Examiner has not pointed out, and Applicant is unaware of, any portion of Gray that teaches or suggests a method comprising, *inter alia*, after commitment of a transaction, a first access module in the database system writing an end transaction indication to a first transaction log portion in volatile storage, the first access module being part of a cluster of access modules, as required by Applicant's claim 10. As such, neither Tada nor Gray, taken alone or in combination, teaches or suggests all of the limitations of Applicant's claim 10. The result is that Applicant's claim 10 and its dependents are patentable over Tada in view of Gray under 35 U.S.C. § 103(a).

In light of the foregoing, Applicant asks the Board to reconsider this application and allow all of the claims. Please apply any charges that might be due, excepting the issue fee but including fees for extensions of time, to deposit account 14-0225.

Respectfully,



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(viii) Claims Appendix

1. (Previously presented) A computer implemented method of performing a transaction in a database system, comprising:

receiving a transaction to be performed, wherein the transaction is processed by a plurality of access modules; and

before any directive indicating commencement of an end transaction procedure is broadcast to the access modules, performing a flush of a transaction log from volatile storage to non-volatile storage by each of the access modules.

2. (Previously presented) The method of claim 1, further comprising issuing a request to flush the transaction log with a message sent to each of the access modules for performing a last step of the transaction, the last step performed prior to commencement of the end transaction procedure.

3. (Previously presented) The method of claim 2, further comprising performing the flush of the transaction log in a data access step prior to commencement of the end transaction procedure to avoid performance of a transaction log flush in the end transaction procedure.

4. (Previously presented) The method of claim 2, further comprising determining that the last step is being performed by all of the plurality of access modules involved in the transaction.

5. (Original) The method of claim 1, further comprising determining if the transaction log has been flushed before performing the end transaction procedure.

6. (Original) The method of claim 5, further comprising avoiding performance of a transaction log flush in the end transaction procedure if the transaction log has been flushed.

7. (Original) The method of claim 1, further comprising:

identifying the transaction as an implicit transaction.

8. (Previously presented) The method of claim 1, further comprising:

performing the end transaction procedure.

9. (Previously presented) The method of claim 8, performing the end transaction procedure comprising:

skipping broadcast of the directive indicating commencement of the end transaction procedure to the plurality of access modules.

10. (Previously presented) A computer implemented method of performing an end transaction procedure in a database system, comprising:

after commitment of a transaction, a first access module in the database system writing an end transaction indication to a first transaction log portion in volatile storage, the first access module being part of a cluster of access modules; and

the first access module sending an end transaction directive to a fallback access module associated with the first access module, the fallback access module being part of the cluster.

11. (Previously presented) The method of claim 10, wherein the first access module sends the end transaction directive to the fallback access module but not to other access modules in the cluster.

12. (Original) The method of claim 10, wherein sending the end transaction directive comprises sending an end transaction-part one directive.

13. (Previously presented) The method of claim 12, further comprising the fallback access module broadcasting an end transaction-part two directive to all access modules in the cluster.

14. (Previously presented) The method of claim 10, further comprising the fallback access module writing an end transaction indication to a second transaction log portion in volatile storage.

15. (Previously presented) The method of claim 10, further comprising the first access module flushing the first transaction log portion from volatile storage to non-volatile storage.

16. (Previously presented) The method of claim 10, further comprising the first access module flushing the first transaction log portion from volatile storage to non-volatile storage but the other access modules in the cluster not flushing their respective transaction log portions.

17. (Previously presented) A database system comprising:

persistent storage;

volatile storage; and

a plurality of access modules, wherein each access module is coupled to the persistent storage and the volatile storage; and

each of the access modules being adapted to flush a transaction log maintained by the access module from the volatile storage to the persistent storage before any directive indicating commencement of an end transaction procedure is broadcast to the access modules.

18. (Previously presented) The database system of claim 17, further comprising a controller adapted to determine if each access module has flushed the transaction log maintained by the access module before commencement of the end transaction procedure.

19. (Previously presented) The database system of claim 18, wherein the controller is adapted to skip sending a directive to perform a transaction log flush if the controller determines that each access module has flushed the transaction log before commencement of the end transaction procedure.

20. (Previously presented) The database system of claim 17, further comprising a controller adapted to provide a flush directive with a message to each of the access modules to perform a last step of the transaction before commencement of the end transaction procedure.

21. (Previously presented) An article comprising a computer readable storage medium storing instructions for enabling a processor-based system to:

receive a transaction to be performed, wherein the transaction is processed by a plurality of access modules;

determine that a last step of the transaction involves the plurality of access modules, wherein the last step is performed before any directive indicating commencement of an end transaction procedure is broadcast to the access modules; and

flush a transaction log from volatile storage to a non-volatile storage while the last step is performed by the plurality of access modules.

22. (Previously presented) The article of claim 21, further storing instructions for enabling the processor-based system to:
perform the end transaction procedure, wherein the end transaction procedure follows execution of the last step of the transaction.

23. (Previously presented) The article of claim 22, further storing instructions for enabling the processor-based system to:

avoid broadcast of any directive indicating commencement of the end transaction procedure to the plurality of access modules.

24. (Previously presented) A computer implemented method of performing a transaction in a database system, comprising:

receiving a transaction to be performed on plural access modules in the database system;

maintaining a log in volatile storage to track operations performed in the transaction; and

writing the log to persistent storage before any directive indicating commencement of an end transaction procedure is broadcast to the plural access modules.

25. (Original) The method of claim 24, wherein writing the log to persistent storage comprises flushing the log.

26. (Original) The method of claim 24, wherein maintaining the log comprises maintaining a transaction log.

27. (Original) The method of claim 24, further comprising performing the end transaction procedure, the end transaction procedure comprising writing an end transaction indication into the log.

28. (Previously presented) A database system comprising:

persistent storage;

volatile storage;

access modules coupled to the persistent storage and the volatile storage; and

a parsing engine coupled to the access modules, the parsing engine adapted to perform one of:

(a) providing a directive with a message to perform a last step of a transaction and communicating the directive to the access modules, each access module responsive to the directive to perform a transaction log flush from the volatile storage to the persistent storage before any directive indicating commencement of an end transaction procedure is broadcast to the access modules; and

(b) determining if each of the access modules has performed a transaction log flush before start of the end transaction procedure;

the parsing engine adapted to avoid sending a broadcast directive to the access modules to cause performance of a transaction log flush during the end transaction procedure.

29. (Previously presented) The method of claim 1, wherein the transaction comprises plural steps, the method further comprising:

performing the plural steps prior to performing the end transaction procedure, and wherein performing the flush of the transaction log comprises performing the flush of the transaction log in one of the plural steps.

30. (Previously presented) The method of claim 29, wherein performing the plural steps comprises performing, in each of the plural steps, access of relational table data stored in the database system.

31. (Previously presented) The method of claim 29, wherein performing the flush of the transaction log in one of the plural steps comprises performing the flush of the transaction log in a last one of the plural steps.

32. (Previously presented) The method of claim 1, further comprising each access module adding a first entry to the transaction log to redo the transaction by the access module in case of system failure.

33. (Previously presented) The method of claim 4, wherein performing the flush of the transaction log is prior to commencement of the end transaction procedure if the last step is performed by all of the plurality of access modules, the method further comprising:

performing the flush of the transaction log in the end transaction procedure if the last step is not performed by all of the plurality of access modules.

34. (Previously presented) The database system of claim 17, wherein the access modules are further adapted to perform a transaction comprising plural steps, and to perform the flush of the transaction log in one of the plural steps.

35. (Previously presented) The database system of claim 34, wherein the one of the plural steps comprises a last one of the steps.

36. (Previously presented) The database system of claim 35, wherein the transaction log comprises a first entry associated with each access module to enable a redo of the transaction in case of system failure.

37. (Previously presented) The database system of claim 36, wherein the transaction log further comprises a second entry associated with each access module to enable an undo of the transaction.

38. (Previously presented) The database system of claim 34, further comprising a controller adapted to determine whether a last one of the steps involves all the access modules, and in response to determining that the last one of the steps involves all the access modules, the controller further adapted to send a directive to all the access modules to perform the flush of the transaction log in the last one of the steps.

39. (Previously presented) The database system of claim 38, in response to determining that the last step does not involve all access modules, the controller further adapted to send a directive to perform the flush of the transaction log in the end transaction procedure.

40. (Previously presented) The article of claim 21, wherein the transaction comprises plural steps, the article further storing instructions for enabling the processor-based system to:

perform the plural steps prior to commencement of the end transaction procedure, and

wherein performing the flush of the transaction log comprises performing the flush of the transaction log in one of the plural steps.

41. (Previously presented) The article of claim 40, wherein performing the plural steps comprises performing, in each of the plural steps, access of relational table data stored in a database system.

42. (Previously presented) The article of claim 40, wherein performing the flush of the transaction log in one of the plural steps comprises performing the flush of the transaction log in a last one of the plural steps.

43. (Previously presented) The article of claim 42, further storing instructions for enabling the processor-based system to cause each access module to add a first entry to the transaction log to redo the transaction by the access module in case of system failure.

(ix) Evidence Appendix

None.

(x) Related Proceedings Appendix

None.